~~WRSC~~ WRSOC

Comments to Betty 7/16.

NOTE: The response to Question 7 contains proprietary information.

1. QUESTION

It is impossible to determine the extent to which the runoff retention or holding pond will treat disturbed area drainage. How many acres of disturbed and/or undisturbed drainage will be treated? A drainage map should be included in the permit to delineate these various areas of the watershed.

RESPONSE

The runoff catchment basin will be designed to contain runoff from a 100-year storm, as described in Section 1.3.3.2 of the Mining Permit application. The drainage contained by this dam is shown in the attached Figure 1-7a. Approximately 850 acres is contained in the drainage area. Less than 20% of this area will be disturbed by Phase I project development.

2. QUESTION

Figure 1-7 shows the location only of the evaporation holding pond for treated wastewater effluent. What is this pond sized for? What is the daily flow rate entering the pond? Give approximate quantities of the various processing flow rates which will be passed into this pond.

not answered
sort of answered
NOT EVEN ADDRESSED.

RESPONSE

The pond is sized to provide adequate surface area for percolation and evaporation of treated domestic wastewater, with a maximum 2-month holding capacity. Average daily flow rate into the pond is 15,400 gallons. This pond will be utilized for treated domestic wastewater only. Separate ponds will be provided for shaft/decline sinking operations and treated wastewater flow from oil shale processing areas. Construction permits for each pond will be obtained from the Utah Bureau of Water Pollution Control (UBWPC).

924,000 gal

3. QUESTION

Section 1.3.3.5 states that part of the water supply will be provided by alluvial wells. These water rights must be included in those appropriated by the State Engineer. Groundwater which is intercepted (after grouting attempts are made) and utilized on the surface must also be appropriated by the State Engineer. If grouting does not prove successful, White River Shale Oil Corporation (WRSOC) must determine whether the surface retention pond can adequately hold the resulting volume of "operational" flow. It may be necessary to propose a dewatering scheme for this pond.

RESPONSE

A water appropriation permit was submitted to the Utah Division of Water Rights on June 14, 1982, and included groundwater from the alluvial wells. WRSOC understands that water appropriation permits are required for all intercepted ground and surface waters. All such permits will be acquired as necessary.

Based on existing information, it is believed that water production from the shaft and decline will be minimal (ie. 200 gpm maximum). Therefore WRSOC feels that the proposed runoff retention pond can adequately accomodate any mine dewatering requirements which might arise. The runoff retention pond will be able to hold 387 acre-feet. Should water production exceed our projections, a modification to our mine dewatering handling scheme will be developed and submitted to the Division.

4. QUESTION

WRSOC proposes to use berms and ditches to control runoff during construction. OGM does not concur with the statement made in Section 1.2.5 of the application that "occasional runoff from the construction sites will result in water flowing down natural drainage". Even though the proposal calls for structural controls, every effort should be made to control sedimentation at the source and prior to entering the natural drainages until the runoff retention pond is completed. WRSOC should alter the temporary erosion measures to assure this effort is achieved.

RESPONSE

WRSOC erosion control plans are based on controlling sedimentation at the source (ie., each construction area). As delineated on the site plan, construction of mining facilities located on the surface will occur on ridges, slopes, and drainage of relatively small area. As noted in Section 1.2.5 of our application, the amount of waterflow over construction-disturbed land will be minimized by diversion of runoff around these areas. Runoff from construction sites will contain some suspended solids even with the planned application of erosion controls. Nevertheless, construction site runoff will be further controlled to reduce the suspended solids load flowing downstream. As noted in our application, a number of berms will be constructed in series down the drainage channels for this purpose. These berms will be located as close to the source as practical, based on an evaluation of topography and hydrology. WRSOC believes that the combination of diversion of natural runoff, erosion control at disturbed areas, and sediment control features constitute sedimentation control at the source. The effectiveness of these measures will be evaluated in the field, and any necessary modifications will be made to ensure that this goal is achieved.

5. QUESTION

With regard to the bond proposed to cover the Phase 1 permit:

In the MR-1 Form, the applicant states that 635 acres will be disturbed while in 2.6 the language states that the calculation is based on "a total of 2,000 acres disturbed during Phase 1." Please clarify. The posted bond would provide $1,575 per acre if 635 acres is used.

The acceptance of any bond proposal is at the discretion of the Board of Oil, Gas and Mining. The Board may accept the bond previously filed with BLM if it can be justified that it assures an acceptable degree of land reclamation.

WRSOC should submit a proposed bond which includes, at a minimum, information addressing sites clean-up, regrading and contouring, stabilization, labor, mobilization and demobilization, shaft closure, monitoring and an inflation factor. Upon review of this proposal, the Division will make its recommendations to the Board.

Scheduling involves nine years development and mining one year projected for dismantlement and two years for revegetation, plus three years monitoring. Bond will need to be applied for 15 years for Phase I for 635 acres.

RESPONSE

It is the intention of WRSOC to divide Phase I into portions and submit a bond for each portion as Phase I proceeds. This and other bond-related matters will be discussed during the July 13th meeting between BLM, UDOGM and WRSOC.

6. QUESTION

Where were the cross Sections A-A', B-B' and C-C' taken? A map should be submitted which includes where the lines were obtained.

RESPONSE Clarified, just poorly noted. [POORLY DRAWN X-sections]

The location of these cross sections are shown in Figure 1-7, in the submitted Mine Permit application.

7. QUESTION

Although the WRSP deals for the most part in conceptual designs, it is requested that an estimate of the amount and extent of underground mining which will occur during Phase I be submitted to the Division. Figure 1-9 of the MRP does not indicate if this mining layout is proposed for any estimated amount of time in particular. A plan should be submitted locating the extent per year of underground mining activity (perhaps color coded by year) for the life of Phase I. This would be utilized to enable the Division to better understand the entries room and pillar design in relation to the surface facility construction. These surface facilities should be superimposed upon the map similar to map Fig. 3.5-6 in the DDP. A 1" = 200' scale is suggested. Will mining be conducted in the vicinity of the Moon Lake power transmission line?

RESPONSE - THE FOLLOWING IS PROPRIETARY INFORMATION:

The entire oil shale resource beneath Tracts U-a and U-b will be mined during Phases I, II and III. Eight panels will be developed in the WRSP mine during Phase I. The enclosed Figure 1-9a (overlay for Figure 1-3,

Sheet 1) shows the layout of the first four panels. The overlay should be aligned with Figure 1-3 using the inscribed coordinates on both figures. The shaded areas on the overlay show mined areas around the pillars. For ease in using the overlay, all mined areas have not been shaded.

Initially, Panels 1 and 2 will be developed simultaneously, followed by Panels 3 and 4. They are not completely shown on the overlay, but will extend to the south as far as Panels 1 and 2.

The remaining panels are currently being designed, and data will be transmitted to UDOGM as soon as they are available. The general location of the remaining panels will be east and south of Panel 4. The rate of mine development to 30,000 tons/day will be determined after initial testing in the mining zone. The dashed lines on the overlay indicate the location and direction of future mine development. "Permanent Stopping" and "Temporary Stopping" indicated on the overlay represent permanent and temporary structures built in mined-out areas for ventilation routing.

The area mined during Phase I will not extend to the vicinity of the Moon Lake power transmission lines, as shown on Figure 1-2. However, additional high voltage power lines will be brought to the site from the Moon Lake power plant and these will pass over the Phase I mining area. As noted in our response to Question 14, mine design is based on precluding surface subsidence and a subsidence monitoring program will be implemented.

8. QUESTION

A clarification of where the "grubbing operations" will be subgraded is needed. Delineate on appropriate maps.

RESPONSE

Most of the grubbing operations will occur in the areas shown on the color-coded Figure 1-3, Sheets 1, 2 and 3, provided to UDOGM on May 24, 1982. The subgrade discussed in Section 2.3.1.1 refers to depressions below grade resulting from grubbing operations. These depressions will be filled with subsoil and topsoil before final grading, as described in the Mining Permit application. This work also encompasses the construction of drainage features such as diversions and culverts to avoid impoundment of waters in subgrade areas.

depressions + grading + diversion structures

9. QUESTION

Will all regrading work be done following the termination of mining and processing activities or will some of this work be done contemporaneously during life of the operation? If the latter is the case, please provide the Division with an indication of when or where this will occur.

RESPONSE

The regrading plan described in Section 2.3 will be implemented concurrent with the Phase I construction. Regrading will also occur during processed shale disposal area reclamation as discussed in Section 2.5. Also,

relatively minor amounts of regrading will occur during abandonment as discussed in Section 2.2. Thus, regrading will commence at the "Begin Mine Related Construction" milestone of the WRSOC project schedule (see introduction to Mining Permit application) and will continue through the life of the project. Initial regrading will occur in the areas delineated for surface mining facilities as shown in Figure 1-3. Subsequently, regrading will occur in the processing facilities area and the spent shale disposal area shown in Figure 1-2. Regrading during abandonment will be limited to filling the cavities created during the removal of salvageable equipment and to covering broken up concrete pads and any abandoned roads.

10. QUESTION

Please provide suitable information on the slope of the processed shale area including the slope of the terraces. Will they be level or sloped to the inside or outside?

RESPONSE

At this time, only limited data are available on the integrity of processed shale disposal piles since there are no commercial shale retorts nor sufficient processed shale from the selected retorts. However, tests of stability and other parameters will be conducted on the experimental spent shale pile prior to developing detailed plans for the processed shale disposal area. Generally, the finished grade for the disposal pile will be sloped to provide drainage toward the mouth of the canyon, where it will be retained by the runoff and leachate holding pond. As described in Section 2.4.1.3 and as shown on Figure 1-8, the processed shale surface will be shaped into water harvesting slopes 8 to 10 feet wide alternating with 5 feet wide flat terraces. Details of the final surface of the spent shale pile will be determined following testing at the experimental spent shale pile, and will be submitted to UDOGM.

11. QUESTION

The operator states in 2.3.1.1 that "if sufficient quantities" of material necessary to achieve final grade are not available "material shall be obtained from approved sources on or outside the property boundary limits." Has a materials balance been done with respect to this? In order to minimize surface disturbance it would be desirable to plan operations in such a way so as to eliminate the need for a borrow area. Borrow areas would themselves require reclamation and should be within the permit area so as not to extend the impact of mining.

RESPONSE

The grading plan has been developed to balance cut and fill quantities as far as is practicable. However, there are factors which may alter the nominal balance. These include variable expansion following blasting, suitability of material for fill and preservation of drainage patterns. If

it becomes apparent that borrow is required to complete earthwork in particular construction areas, UDOGM will be notified. If required, borrow will be obtained from other areas which will be disturbed. If not available from these areas, near-by on-tract areas will be utilized. Borrow will be taken from off-tract areas as a last resort. Borrow areas will be reclaimed as general disturbed areas (see Section 2.4 of permit application for reclamation procedures).

12. QUESTION

Important wildlife habitats such as riparian areas or roosting areas for raptors were not mentioned in the application. Identify any such areas which are present on the permit area. If any such area will be disturbed, describe it and discuss measures which may be utilized to reclaim these areas in order to mitigate important habitat losses.

RESPONSE

Significant wildlife habitats will not be impacted by Phase I development and operations of the WRSP. However, the Lease Agreement-Environmental Stipulation 4B (Attachment 1) requires that whenever disturbance of fish and wildlife is inevitable, a mitigation plan be submitted to the Oil Shale Office for approval. A monitoring program as described in Attachment 2 will be implemented to identify any of these potential impacts; and to determine what mitigation, if any, is necessary. Currently, WRSOC has a wildlife management plan which is included in the DDP, Section 4.7. In addition WROC has received a Threatened and Endangered Species Clearance for the Project from U. S. Fish and Wildlife Service (Attachment 3). A golden eagle nest has been identified at the southwest corner of Tract Ua (utilized twice in the past seven years). This nest will not be impacted in Phase I.

Approximately 1.5 acres of riparian habitat will be impacted by the development of the alluvial wells along the White River. No mitigation measures are planned as the area represents an insignificant portion of the riparian habitat and will be inundated by the White River Reservoir.

13. QUESTION

For future land-use, the applicant mentions "oil shale mining and processing and livestock grazing." This should be changed to reflect the use after abandonment. Also, will wildlife habitat be among the future land uses? If so, the applicant should state this.

RESPONSE

MR Form 2, question 3 will be corrected to read:

(a) Prior Land Use(s) - Livestock grazing, oil and gas exploration, and wildlife habitat.

(b) Current Land Use(s) - Livestock grazing, wildlife habitat.

(c) Possible or Prospective Future Land Use(s) - Oil shale mining and processing, livestock grazing and wildlife habitat.

(d) Post Abandonment Land Use* - Livestock grazing and wildlife habitat.

*To ensure that wildlife habitats are recovered, WRSOC is required by its Lease to "restore the vegetation of disturbed areas by reestablishing permanent vegetation, which will support fauna of the same kinds and numbers as those existing at the time the baseline data was obtained..." (Environmental Stipulation 11L).

14. QUESTION

No reference was found in either the Mining and Reclamation Plan nor to any great extent in the DDP to any discussion or investigation into the potential for subsidence effects. Owing to the laminated, thinly bedded and variable type of overburden in addition to the relatively near presence of the Birds Nest aquifer, further attention should be given to the possibility for subsidence, including possible monitoring and mitigation measures. A more comprehensive treatment of the subject is requested.

RESPONSE

The mine is specifically designed to avoid surface subsidence. However, the remote possibility of subsidence has been recognized and evaluated, and a subsidence monitoring program is outlined in Section 7.4 of the Environmental Monitoring Manual. Results obtained from that program would be used in the design and implementation of any contingency measures necessary. Additional data, including seismic or acoustic monitoring, will be available from the mine stability monitoring program and will be used to assess potential and actual subsidence.

Where?

15. QUESTION

What and where are the "approved disposal areas" for trash, etc?

RESPONSE

According to the DDP, Section 3.11, Phase I solid waste will be landfilled in the processed shale disposal area. The proposed location of the solid waste disposal site is shown on the enclosed revised plot plan. Construction and opeation of this facility will be in compliance with the Utah Solid and Hazardous Waste Committee's "Code of Solid Waste Regulations". Prior to construction of the WRSP solid waste landfill, trash and refuse material will be transported off the tracts to a State approved solid waste landfill, probably in Vernal. with appropriate agreements made.

16. QUESTION

What will be the fate of the fine shale? Will it be treated separately, reclaimed or mixed with the processed shale, etc.?

RESPONSE

Raw shale fines will be stored in the small canyon at the head of the mine area watershed, as indicated on Figure 1-3, Sheet 1. As described in Section 3.3.6 of the DDP, fines produced during Phase I will be stored for separate retorting during Phase II and III in a fines-type retort. As an alternative, WRSOC is currently investigating the feasibility for agglomerating fines for use in the Union retort. The study is being done by the Colorado School of Mines. Retorted fines will be disposed of in the spent shale disposal area. Fines produced during Phase II and III will be retorted during Phase II and III, respectively.

17. QUESTION

Has the pillar size around gas wells been designed yet? If so, what criteria were used in development of reasonable safety factors? If not, a commitment to submitting these data to the Division prior to mining should be made. Will the #1 gas well be intercepted by mining during Phase I?

RESPONSE

In order to protect the mine, the room-and-pillar layout of the mine has been designed so that each plugged exploratory gas wells will be enclosed within the center of a pillar, 100 feet square. This value for the pillar size is based on available geotechnical data which indicates the rock in these pillars is competent. As mine development reaches each pillar-encased well, the competency of the surrounding rock will be re-evaluated and, if need be, the design of the pillar reassesed. Since the mine development for Phase I is to proceed in a southerly and easterly direction from the shafts and decline, the Gem #1 gas well will not be intercepted during Phase I. However, once mining approaches the GEM #1 well, it will be plugged to ensure safety in the mine. Other wells that may be intercepted have been grouted with concrete from top to bottom. As noted above, they will be centered within 100 foot square pillars, and thus pose no dangers during WRSP Phase I mine development.

18. QUESTION

Where will the WRSP dispose of the ripped road pavement? A design specifically addressing volume and storage capabilities should be submitted.

RESPONSE

Although Phase I is the only part of the project discussed in the submitted Mining Permit, it is the intention of WRSOC to proceed all the way through Phase III, approximately 25 years from now. Thus, it is diffucult at this

time to cite the specifics of mine and plant abandonment 25 years hence. However, general abandonment procedures have been developed and included in the DDP and the Mining Permit as a planning measure. Furthermore, a detailed abandonment plan will be prepared prior to actual abandonment and submitted for approval to The Deputy Minerals Manager of the Oil Shale Office. This is a requirement of our Federal lease. A copy of the detailed abandonment plan will also be submitted to the Division for approval prior to abandonment activities.

This abandonment plan will identify roads which will remain following project abandonment as part of the county road system, as well as those roads which will be reclaimed. A plan for disposal of ripped road pavement from reclaimed roads will be prepared addressing volume and storage capacities as a part of the overall abandonment plan. Current project plans are to dispose of ripped pavement from abandoned roads in or adjacent to the roadbed. These areas will then be covered with topsoil and revegetated per general disturbed area revegetation (Mining Permit application, Section 2.4).

19. QUESTION

How deeply will the concrete foundations be buried after having been broken up upon reclamation?

RESPONSE

how much (avoiding answer)

Surfaces of concrete foundations, pads etc. will be broken up and covered with sufficient topsoil to accomodate vegetation growth. The degree to which concrete surfaces will be broken up, as well as the specific amounts of soil required to adequately cover these surfaces, has not yet been determined. These items will be addressed in detail in the abandonment plan as discussed in Question 18.

20. QUESTION

Pre- and postmining contour maps and attendant cross sections are necessary to complement the regrading plan in Section 2.3. These should describe all disturbed areas including spent shale disposal locations.

A cross-sectional map should include both existing and proposed grades of the spent shale disposal areas and waste rock embankments as well as all dams. The postmining topography for the entire Phase I operational area should be presented on a concise map that portrays nonimpoundment of drainage through appropriate regrading as discussed.

RESPONSE

Figure 1-3, Sheets 1-3 shows the pre-mining contours at the Phase I mine area. Detailed grading maps are currently being developed and will be submitted to UDOGM upon request. Pre- and post-mining cross sections are

that is what was asked for? Needed to look @ spent shale disposal area - projected X-section

included in Figure 2-1, Sheets 1 and 2. These cross sections are representative of a typical Phase I road, building, and conveyor system. As discussed in the response to Question 10, the final configuration of the spent shale area will be developed based on experience gained at the experimental spent shale disposal area. Grading and drainage established during construction and mining operations will remain during abandonment. WRSOC is obligated to prepare a detailed decommissioning and abandonment plan as a condition of approval of the DDP. That plan will address land configuration at the time of abandonment.

So still don't have feel for stability.

21. QUESTION

In reference to the slopes of the waste rock embankment, the question arises about surface drainage facilities for the shale disposal area. DOGM requires assurance that there will be no impoundment of water behind the embankments either before or during operations. WRSOC should further detail the operational use of the spent shale disposal embankments and clarify the drainage control plans for these areas.

RESPONSE

The only impoundment of water from the spent shale disposal site will occur behind the runoff and leachate retention dam. Rock embankments are incorrectly identified in Figure 1-8 as dams. As discussed in our response to Question 10, insufficient data is currently available to ensure that a stable, self-supporting spent shale pile can be constructed. Therefore, WRSOC has identified the use of rock embankments in the spent shale disposal area as a structural component of the pile. If following tests of processed shale it is determined that these rock embankments are not required then the shale pile will be terraced in a fashion similar to that shown in Figure 1-8.

In either case, free drainage to the runoff and leachate holding pond will be maintained as the pile is built. If rock embankments are utilized, they will be brought up in lifts concurrent with the deposition of spent shale to preclude impoundment of water.

22a. QUESTION

Waste rock will be crushed to what size?

RESPONSE

The Mining Permit application stated that waste rock would be crushed and used in the cores of the leachate dams and in spent shale embankments. However, current plans are to stockpile waste rock at the sites located on the enclosed revised plot plan. Ultimate use of the waste rock in dams or the spent shale embankments depends on:

- The competence of the waste rock as dam core materials, and
- The ability of the processed shale pile to support itself without waste rock embankments.

Therefore, the ultimate use of the waste rock cannot be determined until it has been properly analyzed. If the waste rock is used in dams and processed shale pile embankments, it will be crushed to a maximum diameter of 12 inches.

22b. QUESTION

Have any tests been conducted on the pyritic content and susceptability for acid development?

RESPONSE

In the Green River formation which includes the mining zone (from 490 feet down to 1400 feet), the pyrite content will average less than one percent. This is an estimate based on examination of drill cores during the 1981-82 geotechnical drilling program, and a current review and evaluation of drill core logs.

No site-specific information is available, but a number of factors suggest that it is unlikely that an acid leachate would be produced in the waste rock piles. These factors are:

- The potential for acid production (pyrite) is relatively small (i.e. 1%).
- Rock size in the dumps will be relatively coarse, and only a limited amount of pyrite will be exposed to oxidation conditions.
- The surrounding rock represents an alkaline environment which would neutralize the formation of acid. This is especially true of the Green River rock which is a dolomitic marlstone with nahcolite.

22c. QUESTION

Does the use of this rock in shale embankments refer to an outer coating on the shale fines storage or spent shale disposal slopes, etc?

RESPONSE

The shale embankments refer to a structural embankment independent from the shale fines or spent shale, rather than to an outer covering of the piles. As noted in the response to Question 21, shale embankments may not be required if the spent shale is self-supporting. (running tests now?)

23. QUESTION

Will the waste rock and muck generated in shaft and decline construction be analyzed for toxicity to assure safety in surface disposal?

RESPONSE

The waste rock and muck will not be analyzed for toxicity because of the alkaline rock environment and relatively low potential of acid production, as described in the response to Question 22b. Based on core analyses, no other potential for toxicity exists.

24. QUESTION

The drainage plan map indicates that surface runoff will be conveyed over, under and through certain access and on-site roads. What event criteria will be used for culvert design?

RESPONSE

Temporary culverts will be sized for the maximum flow rate resulting from a 10-year storm. Permanent culverts will be sized for the maximum flow rate resulting from a 25-year storm, as per Utah State Roadway Drainage Design Standards.

25. QUESTION

What specific designs have been developed for the permanent closure of portals, shafts and declines?

RESPONSE

Specific designs for the permanent closure of the portals, shafts and declines have not been developed to date. It is difficult to cite specifics of mine closure 25 years hence. However, details will be addressed in the abandonment plan when it is developed (see Question 18).

26. QUESTION

A detailed construction schedule is needed to aid in hydrologic and other resource protection during operation. Will the embankments be built simultaneously with the dams and the spent shale disposal area? Will the experimental spent shale vegetation area be built first? When will the runoff and leachate holding pond dam be built?

RESPONSE

A detailed construction schedule for the Phase I spent shale area has not been prepared since the retort design and spent shale characteristics are not yet available. However, the general sequence of activities is as follows:

The first work to be done in the Phase I spent shale area will be the construction of the runoff and leachate dam and holding pond. This will be followed by topsoil stripping and site preparation of the experimental spent shale area. Following commencement of retorting, spent shale will first be disposed in the experimental area. After the experimental spent shale pile is completed, disposal will occur in the spent shale disposal area. Shale embankments, if used (see Questions 21 and 22), will be constructed concurrently in lifts with the top of the spent shale pile.

27. QUESTION

Three different types of revegetation treatments are described: (a) general disturbed areas; (b) temporary mine access road; and, (c) processed shale area. A specific standard for revegetation success needs to be established for each type, this should be based upon the average percent cover of native vegetation in each of the above-mentioned areas.

RESPONSE

a. General disturbed areas: The revegetation procedures for these areas consists of seeding and transplants. Transplanting will be considered successful in the near term if an average of 40% survive after six months. A specific standard for seeding success will not be used since seeding is considered supplemental to transplants. Native plant seeds will be used which characteristically have very low germination rates dependent on a number of uncontrollable factors. A relatively high rate of seeding will be used for this reason. The revegetation program has been designed to approximate the adjacent, undisturbed floristic community in terms of species, diversity, cover, density and standing crop. A standard of 70% of the adjacent undisturbed land cover, after three growing seasons will be considered successful. Long term success will be evaluated as the reestablishment of permanent vegetation of a quality which will support fauna of the same kinds and in the same numbers as the undisturbed communities.

b. The purpose of revegetation of the temporary mine access road is short term erosion control rather than reestablishment of the existing floristic community. These areas will be impacted by future construction and will be either covered by permanent facilities (until abandonment) or revegetated as a general disturbed area. For this reason, revegetation success will be evaluated by a mechanical rather than a biological standard. As long as erosion is being effectively controlled, the program is considered successful and a specific standard for revegetation success is not applicable.

c. Revegetation of the processed shale pile is a unique program being developed by Dr. Cyrus McKell for WRSOC. This research program is described in Appendix B of the Mining Permit application. Based on completed, ongoing and future research, revegetation success criteria will be established. Due to the nature of the revegetation program (i.e. initial establishment of plants in soil filled trenches) the revegetation success for the spent shale pile will be dependent on a variety of parameters. These parameters include colonization, establishment, and growth of plants from the trenches into the spent shale pile. Thus a simple standard of revegetation success in the initial trenches would not be an indication of pile revegetation sucess. WRSOC plans to conduct additional revegetation studies utilizing Union retort processed shale when sufficient volumes become available. Studies will also be conducted at the experimental spent shale area identified on Figure 1-8. Appendix D describes the planned revegetation research which will be conducted on the experimental spent shale area.

28. QUESTION

A discussion of how the revegetation areas will be monitored for success including timing and parameters measured and how they will be compared with the established success standards should be included.

RESPONSE

A survey of the revegetated areas will be conducted semi-annually as a part of WRSOC's overall revegetation/reclamation monitoring program. See Sections 3 (Vegetation Monitoring) and 5 (Terrestrial Wildlife Monitoring) in the WRSOC Environmental Monitoring Manual for more details. Initially, representative areas will be sampled to assess density and diversity. As the revegetated areas mature, additional parameters such as percent cover, distribution, and vigor will also be assessed and these results will be compared to similar measurements made on adjacent undisturbed areas.

29. QUESTION

not addressed.

It is strongly recommended that a map outlining the areas where each treatment will be implemented could be submitted. A vegetation map of the permit area would also be helpful since revegetation success standards are set by the native vegetation types.

RESPONSE

not really

The majority of the Phase I mine-related areas to be disturbed are indicated on the color-coded maps provided to UDOGM on May 24, 1982. All temporary roads and topsoil stockpiles will be temporarily revegetated. The remainder of the disturbed areas shown on the drawings, other than those which will be used for construction, will be revegetated in accordance with the general disturbed area specification.

Figure 1-8 in the Mining Permit application presents the extent of the processed shale disposal area, which will be revegetated as described in Section 2.4 of the Mining Permit application.

For a vegetation map of the permit area, please refer to Figure 2.5-1 in the DDP.

30. QUESTION

The processed shale pile presents a special case since the entire area will not be revegetated. A specific discussion on how success will be measured in this area should be included. The specific methods including fertilization, mulching, irrigation techniques, if necessary, and the exact seed mix to be used in each area should be submitted to the Division.

RESPONSE

As discussed in the response to Question 27c, research on processed shale revegetation is not yet complete. Success standards will be developed and submitted to UDOGM when research has been completed. Please note that processed shale disposal will not begin until 1988. The information

available to date on fertilization, mulching, and seed mix is provided in Tables 2-1 and 2-2 of the Mining Permit application. The final plans will be submitted to UDOGM prior to completion and revegetation of the shale pile.

31. QUESTION

What criteria will be employed to determine if the slopes of the processed shale area will require "temporary" sealing. In 2.4.1.3, it is stated that slopes will be sealed in paragraph 1 and that slopes "may be temporarily sealed" in paragraph 2 as well as 2.4.3.3. Please clarify.

RESPONSE

Section 2.4.1.3 of the Mining Permit application should read, "Slopes for water harvesting may be treated with a chemical stabilizing material.." The criteria for sealing shall be determined by future revegetation research on processed shale, including shale produced by the commercial scale Union retort (in 1983) as well as the White River experimental shale pile. The coefficient of runoff of spent shale water-harvesting slopes is of prime interest. Research on spent shale at Anvil Point, Colorado suggests that sealing may be beneficial and may promote water harvesting. Since the physical characteristics and properties of processed shale differ with each retorting process, the determination as to whether sealing agents will be used cannot be made at this time.

32. QUESTION

Where will the species listed in Table 2-3 (Reclamation Plan Species Mix) be used? What seeding rates and revegetation treatments will be utilized?

RESPONSE

The native species listed in Table 2-3 will be used to supplement the general revegetation program. These species will be used in construction camps, recreation areas, administrative and personnel support areas, and other places frequented by people. The seeding rates and revegetation treatment will be determined during design of these facilities.

33. QUESTION

Table 2-1 does not agree with the text in a couple of instances. In the table it says (under general disturbed areas) that seeding will precede transplanting while the text (page 54) says the opposite. The next paragraph in Table 2-1 gives seeding rates which differ from the seeding rates given in Table 2-2. Please clarify these discrepancies.

RESPONSE

Section 2.4.1.1, General Disturbed Areas, Page 54 should read, "Seeding will precede transplanting." Current plans call for seeding in the fall to be immediately followed by transplanting. Seeding will occur late enough in the fall season to prevent species competition which could be harmful to the success of the transplants. Seeds planted in the fall will germinate in the spring.

Table 2-1, Revegetation Plans Summary by Sub-Area, page 61, has been corrected to identify a drill seeding rate, broadcast rate, and transplanting rate for general disturbed areas of 15 lbs./acre, 30 lbs./acre, and 1750 plants/acre respectively (that is, corrected to be consistent with Table 2-2, Revegetation Plans Species Mix by Sub-area, page 62).

drill seed rate PLS (pure live seed)

34. QUESTION

A more detailed time table for reclamation should be submitted, breaking down the three year abandonment period into segments and describing which areas will be reclaimed and which treatments and reclamation activities will occur at what times.

RESPONSE

WRSP will provide a detailed time schedule for reclamation as a portion of the decommissioning and abandonment plan required by the Oil Shale Office prior to relinquishment of the federal Lease. While the Mining Permit application was for Phase I, it is anticipated that Phases II and III of the project as described in the DDP will be implemented. Reclamation activities will be dependent on the extent of development prior to abandonment and thus cannot be detailed at this time. In general, the following reclamation activities will be conducted:

Seal portals? Shafts?

Structures and equipment will be removed during the first year of abandonment. Affected areas will be leveled, backfilled and covered with topsoil. Seeding will be accomplished in the fall, and will thereafter be maintained for approximately two (2) years. Temporary roads will be reclaimed as soon as a segment is no longer needed. Permanent roads to be abandoned will be broken up, buried in place, and covered with topsoil, as discussed in Question 18. All revegetation will be implemented as outlined in Section 2.4 of the Mining Permit, Mining and Reclamation Plan.

35. QUESTION

In 2.4.6, WRSOC indicates that periodic maintenance inspections will be conducted on revegetated areas. Please define periodic. Relate this to cost in the updated proposed bond.

RESPONSE

annually

All inspection and sampling of revegetated areas will take place on a ~~quarterly basis~~ semi-annual basis as part of the overall environmental monitoring program, as previously discussed in the response to Question 27. In addition, onsite pesonnel will continuously monitor all revegetated areas for slope stability, accidental damage, and any unforseen events.

As discussed in Question 5, all bond related matters will be negotiated during the July 13th meeting between BLM, UDOGM and WRSOC.

36. QUESTION

WRSOC proposes to leave certain impoundments as evaporation ponds with dams enclosed and placarded except for the runoff retention dam which will be fenced and placarded. The State of Utah requires the applicant to leave all impoundments in a self-draining mechanically stable manner at the time of abandonment. By retaining runoff for evaporation this requirement will not be met for either dams or impoundments as described in M-10(3).

WRSOC must appeal to the Board of Oil, Gas and Mining for a variance to this regulation if it is desired to leave dams and impoundments on site. If the Board agrees to a variance then a post-abandoment maintenance agreement must be worked out with the land owner(s) to assure the health and welfare of people and animals is not threatened.

RESPONSE

The runoff retention pond north of the mine site, the shale fines leachate collection pond, and the spent shale runoff and leachate collection pond will be left in place during abandonment. These impoundments are required to protect the environmental integrity of the site. Detailed abandonment requirements and procedures for these ponds will be addressed in the decommissioning and abandonment plan required by the Oil Shale Office prior to site abandonment. WRSOC will apply to the Board of Oil, Gas and Mining for the required variances at that time. All other dams and ponds will be filled, levelled, and natural drainage restored at abandonment.

37. QUESTION

Soil maps submitted June 8, 1982 adequately address the depth of removal and volume of removal needs. How will soils in "peripheral areas" such as the mine access road, the water well service road and the bachelor camp be handled with regard to removal, protection and revegetation?

RESPONSE

Topsoil resources along the mine access road, the water well service road, and the bachelor camp have now been surveyed but isopach maps have not yet been prepared. These maps in conjunction with the previously submitted topsoil management plan will be used to guide topsoil removal from these areas. The topsoil management plan for these areas will consist of recovery, short term storage, and reuse near their origins. These topsoil stockpiles will not be protected nor revegetated because of the short period of storage, i.e., approximately 30 days.

38. QUESTION

Utilizing the 22 million cubic feet figure (505 acre feet) cited in Section 1.3.5.1 and the 635 acre disturbance figure provided in the MR-1 Form, a uniform depth of topsoil replacement of approximately 9.5 inches is possible. However, using the more defined figures provided in the June 8, 1982 letter, 60,000 cubic yards (37.2 acre feet) will be available. This would provide 0.72 inches of soil available for distribution at a uniform depth. Does WRSOC intend to exclude certain areas from reclamation due to steepness or some other adverse condition? Please explain? Are these figures accurate? How might this discrepancy be explained? What is the expected depth of topsoil replacement? Please relate this depth as well as anticipated volume to the specific areas to be reclaimed. A map delineating these relationships would be useful.

Will any soil be obtained from the future spent shale disposal area (most of this area is indicated to be beyond the bonds of the soil survey according to the map submitted on June 8, 1982)? In the May 24, 1982 letter on this subject, WRSOC states that soil will be removed from all areas to be disturbed as indicated on Figure 1-3. Please clarify.

What is the anticipated depth replacement and soil volume necessary for reclamation of terraces associated with processed shale area?

Is adequate soil available for reclamation? Please provide updated calculations to verify from where will deficit soil material, if any, be obtained?

RESPONSE

The depth of topsoil replacement inferred from information provided in the permit application and WRSOC's letter of June 8, 1982 are consistent. Information provided in the Mining Permit was a rough approximation based on gross acreage impacted and a representative depth of topsoil derived from environmental baseline data.

The 22 million cubic feet of topsoil cited in Section 1.3.5.1 of the permit application yields a uniform depth of topsoil replacement of approximately 9.5 inches over the 635 acre area. Subsequently, additional topsoil information was obtained and provided to UDOGM (on June 8). This information indicated that 45,000 cubic ~~feet~~ yards topsoil is available in the approximately 38 acre site encompassing the mining area. This yields a uniform topsoil depth of approximately 9 inches. Additionally, it was estimated that an additional 15,000 cubic yards of topsoil material woud be available from the water well access road and Module One Bachelor Camp; approximately 9 acres. Thus the 60,000 cubic yards referred to, is in an area of approximately 47 acres, yielding a uniform topsoil depth of approximately 9.5 inches.

typo?

WRSOC plans to respread topsoil in areas suitable for revegetation and conserve any remaining topsoil for future use. A nominal 8 to 10 inches of topsoil will be respread.

The topsoil quantities delineated above do not include a processed shale disposal area.

All recoverable topsoil in the processed shale disposal area will be salvaged and stockpiled prior to the deposition of the shale. This area has not yet been surveyed to estimate topsoil quantities because the production of processed shale is six years in the future. When the time approaches for disturbance of this canyon, topsoil isopachs will be developed and a complete topsoil management plan will be submitted to UDOGM.

39a. QUESTION

With regard to topsoil stockpile protection:

Please indicate whether berms or ditches will be used to protect topsoil from runoff erosion; both are mentioned as possibilities.

RESPONSE

A detailed drawing of the topsoil stockpile near the Mine Service Building is provided as Attachment 4. As shown on this drawing, ditches will be used to direct runoff around the pile. A berm will be used down gradient to collect and contain any topsoil that might wash from the pile.

39b. QUESTION

In the Phase I permit application under 1.3.5.3, WRSOC states that a soil storage stockpile will be treated with a biodegradeable soil stabilizer if they are to be in place for an "extended" period of time. However, in the May 24, 1982 letter, this statement is qualified, "if severe erosion conditions are evident or anticipated." Please explain this difference in language and shed light on the rationale behind it.

RESPONSE

It is anticipated that the topsoil stockpiles will be revegetated by hydromulching and this will be sufficient to stabilize the pile under most conditions. Should adverse environmental conditions cause erosion, additional biodegradable chemical and/or physical stabilizers (e.g. Terra-Tac, jute netting) will be used.

39c. QUESTION

What measures will be implemented if topsoil stockpile seeding is not successful to achieve protection goals?

RESPONSE

Seeding is considered the preferred method of stabilizing the stockpiles due to the desirability of maintaining the biologic activity within the pile. If additional erosion control methods are required, seeding will be augmented by the measure outlined above.